

BRITISH STANDARDS INSTITUTION

2, PARK STREET, LONDON, W1A 2BS

Specification available from:—

CECC 00200 AND

TEXAS INSTRUMENTS LIMITED,
MANTON LANE, BEDFORD, MK41 7PA

TELEPHONE : BEDFORD 67466 TELEX : 82178

ELECTRONIC COMPONENTS OF ASSESSED QUALITY
DETAIL SPECIFICATION IN ACCORDANCE WITH

BS CECC 50 000 : 1981

BS CECC 50 004-129

ISSUE 1,

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MANUFACTURER'S TYPE NUMBER

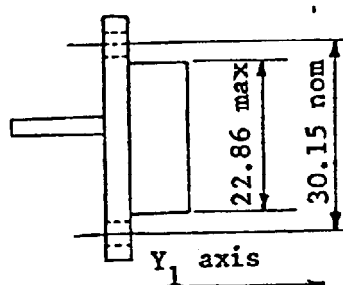
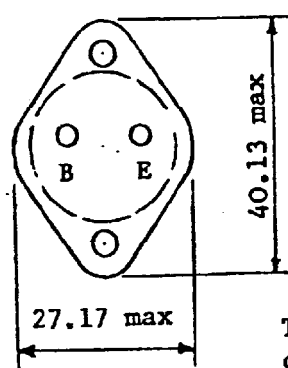
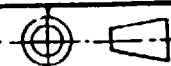
BUX 47 BUX 47A

SEE PD 9002 AND CECC 00200

For ordering information
see Clause 72. CASE RATED BIPOLAR POWER
TRANSISTORS FOR HIGH VOLTAGE
SWITCHING APPLICATIONSNPN TRIPLE DIFFUSED SILICON
PLANAR TRANSISTORS IN
HERMETICALLY SEALED METAL
CASE3. ASSESSMENT LEVEL F
+ ADDITIONAL TESTS

1. Outline and dimensions

Third angle projection

The collector is in electrical
contact with the case.

Outline BS 3934 SO-127A

IEC 191-2 C14A B18. Dimensions in millimetres.

Marking information - See Clause 6

4. LIMITING VALUES (absolute maximum system)These apply over the operating temperature range unless otherwise
stated.

4.1.	T_{case}	Case operating temperature range	-65 °C to +200 °C
4.2.	T_{stg}	Storage temperature range	-65 °C to +200 °C

Voltage Ratings ($T_{case} = -65\text{ °C to }+125\text{ °C}$. See Fig. 9)

		BUX 47	BUX 47A
4.3.	V_{CBO}	850V	1000V
	Collector-base continuous (direct) voltage. $I_E = 0$		
4.4.	V_{CEX}	850V	1000V
	Collector-emitter continuous (direct) voltage. $V_{EB} = 2.5V$		
4.4.	V_{CEO}	400V	450V
	Collector-emitter continuous (direct) voltage. $I_B = 0$		
4.5.	V_{EBO}	7V	7V
	Emitter-base continuous (direct) voltage. $I_C = 0$		

Refer to Qualified Products List PD 9002 and/or CECC 00200 for details of manufacturers
approved to this specification.

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	<u>Current Ratings</u>		<u>BUX 47</u>	<u>BUX 47A</u>
4.6.	I_C	Continuous collector current	9A	9A
	I_{CM}	Peak collector current (Note 1)	15A	15A
	I_B	Base current	3A	3A
4.9.	<u>Power Ratings</u>			
4.9.1.	P_{tot}	Total power dissipation (see Figs. 4 and 5) at $T_{case} = 25^\circ C$	150W	150W
5.	<u>CHARACTERISTICS</u> (not for inspection purposes) at $T_{case} = 25^\circ C$ unless otherwise stated.			
	$V_{CE(SUS)}$	Collector-emitter sustaining voltage. Inductive loop switching measurement. $I_C = 200mA, L = 25mH$	400V	450V
5.1.	$+h_{21E(1)}$	Static forward current transfer ratio. $V_{CE} = 5.0V, I_C = 0.5A$		12 min.
5.2.	$+V_{CE(SAT)(1)}$	Collector-emitter saturation voltage. $I_C = 5.0A, I_B = 1.0A$	BUX 47 } BUX 47A }	1.5V max.
	$+V_{CE(SAT)(2)}$	Collector-emitter saturation voltage. $I_C = 500mA, I_B = 50mA$	BUX 47 } BUX 47A }	1.5V max.
5.4.	$+V_{BE(SAT)(1)}$	Base-emitter saturation voltage. $I_C = 5.0A, I_B = 1.0A$	BUX 47 } BUX 47A }	1.6V max.
5.5.	$+I_{CEX(1)}$	Collector-emitter cut-off current $V_{CE} = V_{CEX} \quad V_{EB} = 2.5V$	{ BUX 47 BUX 47A }	0.15mA 0.15mA
5.6.	$I_{CEX(2)}$	$V_{CE} = V_{CEX} \quad V_{EB} = 2.5V$	{ BUX 47 BUX 47A }	1.5 mA 1.5 mA
	$+I_{CER(1)}$	Collector-emitter cut-off current $V_{CE} = V_{CEX} \quad R_{BE} = 10 \text{ Ohms}$	{ BUX 47 BUX 47A }	0.4 mA 0.4 mA

* These parameters are measured under pulsed conditions. Pulse width = 300 μ s, Duty Cycle = 2%.

† Measured in Groups A or C

NOTE 1: Pulse rating, pulse duration = 2ms

5. CHARACTERISTICS (Cont'd)

5.6. $I_{CER(2)}$ $V_{CE} = V_{CEX'}$ $R_{BE} = 10 \text{ Ohms}$ $\left\{ \begin{array}{l} \text{BUX 47} \\ \text{BUX 47A} \end{array} \right\}$ $\begin{array}{l} 3.0 \text{ mA} \\ 3.0 \text{ mA} \end{array}$
 $T_{case} = 125^\circ\text{C}$

I_{EBO} Emitter cut-off current $\left\{ \begin{array}{l} \text{BUX 47} \\ \text{BUX 47A} \end{array} \right\}$ 1.0 mA
 $V_{EB} = 7V, \quad I_E = 0$

5.7. Switching Characteristics5.7.1. +Resistive Load (See Figs. 2 & 3)

t_{on} Turn-on time $1.0 \text{ } \mu\text{S}$

t_s Storage time $3.0 \text{ } \mu\text{S}$

t_f Fall time $0.80 \text{ } \mu\text{S}$

$I_C = 5.0A, \quad V_{CC} = 150V$

$I_{BON} = 1.0A, \quad I_{BOFF} = 1.0A$

5.7.1. Inductive Load (See Fig. 1)

t_s Storage time $4.0 \text{ } \mu\text{S}$

t_f Fall time $0.4 \text{ } \mu\text{S}$

$I_C = 5A, \quad V_{CC} = 300V$

$I_{BON} = 1.0A, \quad V_B = -5V$

$L_b = 3\mu H, \quad T_{case} = 100^\circ\text{C}$

$R_{th(jc)}$ Thermal resistance junction to case. 1.17 C/W max.

* These parameters are measured under pulsed conditions. Pulse width = 300 μ S, Duty Cycle = 2%

† Measured in Groups A or C

NOTE 1: Pulse rating, pulse duration = 2mS

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6.0 MARKING

6.1. Each device shall bear the following markings:-

- (a) Terminal identification
- (b) Type Number
- (c) Date Code
- (d) Manufacturer's trade mark or factory identification code.

6.2. Each package containing one or more of these transistors shall bear the above markings b, c and d, and in addition, this detail specification number BS CECC 50 004-129.

7.0 ORDERING INFORMATION

The following minimum information is necessary to order a specific device, unless otherwise specified.

- precise type number
- CECC reference of detail specification with issue number and/or date when relevant.
- level of quality assessment as defined in Appendix IIA of CECC 50 000, and, if required, screening sequence as defined in Appendix VI of CECC 50 000.
- any other particulars

Example:- Type number-Detail specification number-Issue number-Level

RELATED DOCUMENTS

BS 2011/IEC 68	Methods for the environmental testing of electronic components and electronic equipment.
BS 3934/IEC 191	Dimensions of semiconductor devices.
BS E9000/ CECC 00 100 to 00 113	General requirements for electronic components of assessed quality.
BS E9007/CECC 00 007	Sampling plans and procedures for inspection by attributes.
BS/CECC 50 000	Harmonised generic specification for discrete semiconductor devices.
IEC 147-2	General principles of measuring methods.
PD 9002/CECC 00 200	Component selection guide.

GROUP A

EXAMINATION OR TEST	BS CECC 50000 REF	CONDITIONS at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL OF ASSMT F	
			MIN	MAX	UNIT	IL	AQL
<u>SUBGROUP A1</u> Visual Inspection	4.2.1.					I	1.5%
<u>SUBGROUP A2a</u> Non-operatives OPEN CIRCUIT SHORT CIRCUIT	4.3.4.	Device considered to be open circuit if h_{21E} Device considered to be short circuit if I_{CEX}	4.0	15.0	mA	II	0.15%
<u>SUBGROUP A2b</u> Collector- emitter cut-off current $I_{CEX}(1)$ Collector- emitter leakage current $I_{CER}(1)$ Collector- emitter saturation voltage $V_{CE(SAT)}(1)$	4.3.4. T.009 4.3.4 T.009 4.3.4. T.003	$V_{EB} = 2.5V$ $V_{CE} = V_{CEX} = 850V \text{ BUX47 } \}$ $\quad \quad \quad = 1000V \text{ BUX47A}$ $V_{CE} = V_{CEX}$ $R = 10 \text{ Ohms}$ $I_C = 5.0A$ $I_B = 1.0A$ $\text{BUX47 } \}$ BUX47A BUX47/47A		0.15 0.4 1.5	mA mA V	II	0.65%

8. INSPECTION REQUIREMENTS

ALL GROUP A TESTS ARE NON-DESTRUCTIVE

GROUP A

Lot by Lot

EXAMINATION OR TEST	BS CECC 50000 REF	CONDITIONS at $T_{amb} = 25^{\circ}C$ unless otherwise stated	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL OF ASSMT F	
			MIN	MAX	UNIT	IL	AQL
<u>SUBGROUP A3</u>						I	2.5%
Static forward current transfer ratio* $h_{21E}(1)$	4.3.4. T.006	$V_{CE} = 5.0V$ $I_C = 0.5A$ BUX 47, 47A	12.0				
Collector-emitter saturation voltage $V_{CE}(SAT) (2)$	4.3.4. T.003	$I_C = 500mA$ $I_B = 50mA$ BUX 47, 47A		1.5	V		
Base-emitter saturation voltage $V_{BE}(SAT) (1)$	4.3.4 T.004	$I_C = 5.0A$ $I_B = 1.0A$ BUX 47, 47A	-	1.6	V		
<u>SUBGROUP A4</u>						S4	4.0%
Switching times		$I_C = 5.0A$					
Turn on time t_{on}		$V_{CC} = 150V$ $I_{BON} = I_{BOFF} = 1.0A$		1.0	μS		
Storage time t_s		(see figs. 2, 3, 4 & 5)		3.0	μS		
Fall time t_f				0.80	μS		

D = DESTRUCTIVE
ND = NON-DESTRUCTIVE

GROUP B
Lot by Lot

EXAMINATION OR TEST	D ND	REF BS CECC 50 000	CONDITIONS at $T_{amb} = 25^{\circ}C$ unless otherwise stated	Inspection Requirements				
				LIMITS			LEVEL OF ASSMT F	
				Min	Max	Units	IL	AQL
<u>SUBGROUP B1</u> Dimensions	ND	4.2.2	Ref. IEC 191-2 Cl4A B18 U_1 U_2 Q A		40.13 27.17 30.40 12.19	mm mm mm mm	S2	2.5%
<u>SUBGROUP B2c</u> Transient turn-off limit <u>Post-test end-points</u> $I_{CEX}(1)$ $h_{21E}(1)$ $V_{CE(SAT)}(1)$	ND	See App. I 4.3.4. T.009 4.3.4. T.006 4.3.4. T.003	$V_{CC} = 350V$ $I_C(MAX) = 14A$ $I_B(ON) = 3A \text{ max.}$ $0.5A < I_B(OFF) < 1.5A$ $V_{BB} = 2V$ $V_{CE(MAX)} = 650V$ $L = 1mH$ $RC = 22\Omega$ (See Figs. 8 & 9) Conditions as for Subgroup A2b Conditions as for Subgroup A3 Conditions as for Subgroup A2b				S4	1.5%
<u>SUBGROUP B3</u> Lead Bending	D	4.4.9.	Force = 10N		No Damage		S3	2.5%